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# Correlation between health-related quality of life using St. George's Respiratory Questionnaire and pulmonary function testing in Thai patients with chronic obstructive pulmonary disease

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**Background** : *Chronic obstructive pulmonary disease (COPD) is characterized by progressive worsening of airway obstruction. The patients usually present with cough, breathlessness on and limited activities, which adversely affects their quality of life. Severity of COPD is traditionally classified by using spirometry. However, the relationship between quality of life and lung function parameters is unclear.*

**Objective** : *To study the effects of COPD on the health-related quality of life of patients in the Outpatient Clinic, King Chulalongkorn Memorial Hospital (KCMH) using Thai version of the St. George's Respiratory Questionnaire (SGRQ) and to evaluate correlation of FEV1% predicted value and the SGRQ score.*

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**Methods** : A cross-sectional analytic study was conducted in COPD patients who visited at the Outpatient Clinic, King Chulalongkorn Memorial Hospital from 1 August 2008 to 30 April 2009. All cases were diagnosed and staged by clinical features and spirometric results as previously described. Correlation of the SGRQ score and FEV1% predicted was evaluated by Pearson's Correlation.

**Results** : Forty COPD patients were enrolled into the study. Sixty percent of the patients were more than 70 years old. SGRQ score in COPD patients was lower than normal, ranged from 1.59 to 85.9 (mean 42.94, SD 24.1). There were weak correlation between the quality of life evaluated by SGRQ scores and FEV1 value ( $r = -0.368$  for total scores,  $r = -0.326$  for symptom scores,  $r = -0.381$  for activity scores and  $r = -0.305$  for impact scores. Note that the higher SGRQ score reflects the worse quality of life). Statistical significance had been shown in all subdomains except impact scores ( $P = 0.019, 0.04, 0.015$  and  $0.056$  for total scores, symptom scores, activity scores, and impact scores, respectively).

**Conclusion** : Health-related quality of life measured by the SGRQ has weak correlation with pulmonary function tests in Thai COPD patients.

**Keywords** : Chronic obstructive pulmonary disease, COPD, emphysema, quality of life, St. George's Respiratory Questionnaire (SGRQ).

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กมล แก้วกิติณรงค์, ธิดา ยิ่งชูตระกูล, ฉันทชาย สิทธิพันธุ์, สมเกียรติ วงษ์ทิม. การศึกษาหา  
ความสัมพันธ์ระหว่างคุณภาพชีวิตที่เกี่ยวกับสุขภาพ ประเมินโดย St George's Respiratory  
Questionnaire และสมรรถภาพปอด ในผู้ป่วยโรคปอดอุดกั้นเรื้อรัง. จุฬาลงกรณ์เวชสาร 2555  
ก.ค. - ส.ค.; 56(4): 421 - 32

- หลักการและเหตุผล** : โรคปอดอุดกั้นเรื้อรัง เป็นโรคที่มีการตีบของหลอดลมอย่างเรื้อรัง โรคแย่ง  
เรื้อย ๆ ผู้ป่วยมักมีอาการไอ เหนื่อยง่ายขณะออกแรง และทำกิจกรรมต่าง ๆ  
ได้น้อยลง ซึ่งส่งผลกระทบต่อคุณภาพชีวิตของผู้ป่วย ระดับความรุนแรงของ  
โรคปอดอุดกั้นเรื้อรังนั้นสามารถประเมินได้จากตรวจใช้ spirometry  
และค่าปริมาตรลมหายใจออกที่ 1 วินาที (Forced Expiratory Volume;  
FEV1) อย่างไรก็ตาม ข้อมูลเรื่องความสัมพันธ์ระหว่างคุณภาพชีวิตและ  
ระดับความรุนแรงของการอุดกั้นทางเดินหายใจนั้นยังไม่ชัดเจน
- วัตถุประสงค์** : เพื่อศึกษาว่าผลของโรคปอดอุดกั้นเรื้อรัง ที่มีต่อคุณภาพชีวิตที่เกี่ยวกับ  
สุขภาพในผู้ป่วยที่รับการรักษาแบบผู้ป่วยนอกที่โรงพยาบาลจุฬาลงกรณ์  
โดยใช้แบบสอบถาม St. George's Respiratory Questionnaire (SGRQ)  
ฉบับภาษาไทย และศึกษาหาความสัมพันธ์ระหว่างค่า FEV1 ที่ได้จาก  
การตรวจสมรรถภาพปอดกับคะแนนจาก SGRQ
- วิธีการศึกษา** : เป็นการศึกษาเชิงวิเคราะห์ ณ จุดเวลาใดเวลาหนึ่ง ในผู้ป่วยโรคปอดอุดกั้น  
เรื้อรังที่เข้ารับการรักษาในแผนกผู้ป่วยนอก โรงพยาบาลจุฬาลงกรณ์ ตั้งแต่  
เดือน 1 สิงหาคม พ.ศ. 2551 - 30 เมษายน พ.ศ. 2552 และให้ความ  
ยินยอมเข้าร่วมการศึกษา ผู้ป่วยทุกรายได้รับการวินิจฉัยจากอาการ  
ลักษณะทางคลินิก และการตรวจสมรรถภาพปอดตามมาตรฐาน  
การวินิจฉัยโรค รวบรวมข้อมูลพื้นฐานของผู้ป่วย ทำการตอบแบบสอบถาม  
SGRQ ฉบับภาษาไทย และประเมินความสัมพันธ์ระหว่างค่า SGRQ scores  
และค่า FEV1 % predicted โดยใช้ Pearson correlation test
- ผลการศึกษา** : ผู้ป่วยโรคปอดอุดกั้นเรื้อรังทั้งหมด 40 คน ส่วนใหญ่ของผู้ป่วย (60%)  
มีอายุมากกว่า 70 ปี พบว่าคุณภาพชีวิตที่เกี่ยวกับสุขภาพ (Health-related  
quality of life) ประเมินโดยค่า SGRQ ในผู้ป่วยโรคปอดอุดกั้นเรื้อรัง  
มีค่าต่ำกว่าคนปกติ โดยมีค่าระหว่าง 1.59 ถึง 85.9 (ค่าเฉลี่ย 42.94, SD  
24.1) มีความสัมพันธ์กันระหว่างคุณภาพชีวิตที่ประเมินโดยค่า SGRQ

ทั้งคะแนนรวม, คะแนนด้านอาการ, ด้านกิจกรรมที่ทำ และคะแนนผลกระทบทางสังคม กับค่า FEV1 ในทิศทางเดียวกันระดับอ่อน โดยที่ค่า correlation coefficient ( $r$ ) = -0.368, -0.326, -0.381 และ -0.305 ค่า SGRQ ยิ่งสูงยิ่งหมายถึงคุณภาพชีวิตที่แย่ลง มีนัยสำคัญทางสถิติในทุกกลุ่มย่อยของ SGRQ ยกเว้น คะแนนผลกระทบทางสังคม โดยมีค่า  $p = 0.019, 0.04, 0.015$  และ  $0.056$  สำหรับคะแนนรวม, คะแนนด้านอาการ, ด้านกิจกรรมที่ทำ และ คะแนนผลกระทบทางสังคม ตามลำดับ

**สรุปผลการวิจัย** : ในผู้ป่วยโรคปอดอุดกั้นเรื้อรังชาวไทยนั้น คุณภาพชีวิตที่เกี่ยวข้องกับสุขภาพที่ประเมินโดย St. George's respiratory questionnaire มีความสัมพันธ์กับค่าการประเมินสมรรถภาพปอดในระดับต่ำ

**คำสำคัญ** : โรคปอดอุดกั้นเรื้อรัง, โรคถุงลมโป่งพอง, คุณภาพชีวิต, แบบสอบถาม.

Chronic obstructive pulmonary disease (COPD) has been characterized by chronic irreversible airflow limitation which progressively deteriorates.

The patients usually suffer from several respiratory symptoms such as chronic cough with a lot of phlegm, and dyspnea on exertion. Spirometry is a key tool in the diagnosis of COPD; and, FEV1% predicted has been accepted from standard guidelines to grade the severity of COPD.<sup>(1)</sup>

Goals of treatments of COPD, both pharmacological and non-pharmacological, are aimed to relieve symptoms, restore lung function decline, and prevent exacerbation with minimal side effects.<sup>(1)</sup> However, health-related quality of life is a more meaningful outcome for the patients' view. This includes good condition in all physical function, mental and social aspects. Additionally, it focuses on individual patients' perception regarding health, expectation and satisfaction in life within the context of their related culture and value systems.<sup>(2, 3)</sup>

To measure health-related quality of life, St. George's Respiratory Questionnaire (SGRQ) has been used to evaluate how much respiratory impairment influences daily livings in each patient.<sup>(4, 5)</sup> It has been used in different severities of COPD and also in other types of chronic respiratory failure.<sup>(4, 6-7)</sup> Although, SGRQ was translated to many languages, no study in Thai COPD patients has been investigated. We, hereby, conduct a cross-sectional analytic study to evaluate quality of life in Thai COPD patients using SGRQ.

Correlation of quality of life measured by SGRQ and degree of airway obstruction measured by FEV1 value were evaluated.

## Methods

This is a cross-sectional and analytical study that has been approved by the Ethics Committee of the Faculty of Medicine, Chulalongkorn University.

### Inclusion and exclusion criteria

COPD patients who visited at the Outpatient Department Clinic, King Chulalongkorn Memorial Hospital during August 1, 2008 to April 30, 2009 were enrolled into the study. Diagnosis of COPD was made by clinical features and spirometry testing showed that post-bronchodilator FEV1/FVC less than 70%.<sup>(1, 8)</sup> Patients who were not able to read or understand the questionnaire or refused to be in the study were excluded.

The sample size was calculated by using the formula to evaluate correlation coefficient as follows:

$$N = [(Z_{\alpha} + Z_{\beta})/Z_r]^2 + 3; \quad Z_r = \frac{1}{2} \ln (1+r/1-r)$$

By replacing  $r$  with  $-0.45^{(9)}$  and  $\alpha$  with  $0.05$ , power =  $0.8$  then the sample size is 36 patients. We estimated incomplete questionnaire around 10%, we thus collected 40 COPD patients in this study.

All patients who consented to participate in the study were asked to complete the St. George Respiratory Questionnaire (SGRQ), Thai version at the Outpatient Clinic. The duration used in each case was 10 -15 minutes. The SGRQ is a self-reported measure, comprises of 3 domains: 1) respiratory symptoms, 2) limitation of activities and 3) impacts on careers, mental status, and social, which totally have 76 questions.<sup>(5)</sup> St. George's University of London (St. George's Hospital Medical School) has given permission to use the SGRQ, in this study. The basic demographic characteristics, e.g. gender, age,

occupation, income, smoking history, underlying disease, were collected. Spirometry was done in all cases and FEV1% predicted was used to categorize COPD patients into 4 groups: mild, moderate, severe, and very severe as previously described.<sup>(1)</sup> Data analysis was performed using SPSS version 16 for Windows. Descriptive data were presented in percentage. Pearson's Correlation test was used to analyze the relationship between SGRQ scores and FEV1% predicted value. P values that less than 0.05 shows statistical significance.

## Results

From August 2008 to April 2009, 40 COPD patients were enrolled into the present study. Most of the patients were male (90%); 60% were older than 70 years old. Seventy-five percent of the patients had been smoked for more than 20 pack-years. The most common co-morbid diseases is hypertension (20%). Details of demographic data are shown in Table 1.

**Table 1.** Demographic data of COPD patients in the present study.

| Characteristics             | Number (percent) |
|-----------------------------|------------------|
| <b>Gender</b>               |                  |
| Male                        | 36 (90)          |
| Female                      | 4 (10)           |
| <b>Age</b>                  |                  |
| 51 - 60 years               | 1 (2.5)          |
| 61 - 70 years               | 15 (37.5)        |
| More than 70 years          | 24 (60)          |
| <b>Income</b>               |                  |
| Lower than 5,000 baths      | 19 (47.5)        |
| 5,000 - 10,000 baths        | 8 (20)           |
| 10,000 - 20,000 baths       | 9 (22.5)         |
| More than 20,000 baths      | 4 (10)           |
| <b>Occupation</b>           |                  |
| Contractor                  | 7 (17.5)         |
| Owner                       | 2 (5)            |
| Employees                   | 1 (2.5)          |
| Officials / State employees | 13 (32.5)        |
| None                        | 17 (42.5)        |
| <b>Education</b>            |                  |
| Primary school              | 30 (75)          |
| High school                 | 4 (10)           |
| University / college        | 6 (15)           |

**Table 1.** Demographic data of COPD patients in the present study.

| Characteristics                       | Number (percent) |
|---------------------------------------|------------------|
| <b>Smoking history</b>                |                  |
| Ex-smokers; less than 20 pack-years * | 7 (17.5)         |
| Ex-smokers; more than 20 pack-years   | 30 (75)          |
| Current smokers                       | 0 (0)            |
| Non-smoker                            | 3 (7.5)          |
| <b>Underlying diseases</b>            |                  |
| Hypertension                          | 8 (20)           |
| Diabetes mellitus                     | 6 (15)           |
| Cerebrovascular disease               | 2 (5)            |
| Gout                                  | 2 (5)            |
| Dyslipidemia                          | 1 (2.5)          |
| Valvular heart disease                | 1 (2.5)          |
| Osteoarthritis                        | 1 (2.5)          |
| <b>Underlying diseases (number)</b>   |                  |
| None                                  | 24 (60)          |
| 1 comorbid disease                    | 10 (25)          |
| 2 comorbid disease                    | 4(10)            |
| More than 2 comorbid disease          | 2 (5)            |

\* Pack - years equals to number of cigarettes (pack perday) multiply with duration of smoking (years)

Mean FEV1 of all COPD patients equals to 47.09 % predicted (18.10 – 98.10; SD = 15.74). According to GOLD guidelines,<sup>(1)</sup> COPD was classified on severity into 4 subgroups by using FEV% predicted (Table 2)

Health-related quality of life in all COPD patients was evaluated by St George's respiratory questionnaire. The total scores and subdomains are shown in Table 3 and Table 4.

**Table 2.** COPD patients in this study classified by FEV1% predicted.

| Classification of COPD by severity   | Number (percent) |
|--------------------------------------|------------------|
| Mild (FEV1 > 80% predicted)          | 1 (2.5)          |
| Moderate (50% ≤ FEV1 <80% predicted) | 15 (37.5)        |
| Severe (30% ≤ FEV1 <50% predicted)   | 20 (50)          |
| Very severe (FEV1 < 30% predicted)   | 4 (10)           |



**Table 3.** St.George's respiratory questionnaire total scores and subdomains.

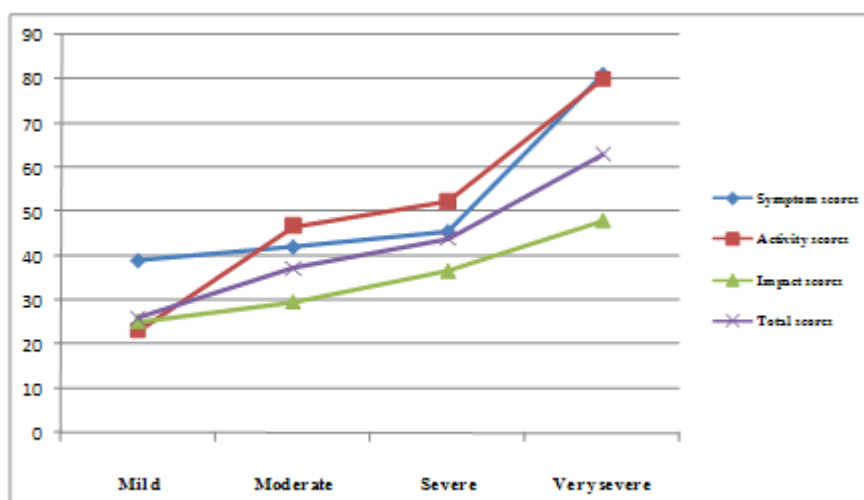
| SGRQ            | Max  | Min    | Average | Std. Deviation |
|-----------------|------|--------|---------|----------------|
| Total scores    | 1.59 | 85.90  | 42.95   | 24.17          |
| Symptom scores  | 0.00 | 96.10  | 47.68   | 27.05          |
| Activity scores | 5.25 | 100.00 | 52.17   | 28.24          |
| Impact scores   | 0.00 | 80.30  | 34.82   | 23.80          |

**Table 4.** St. George's respiratory questionnaire scores and subdomains classified by level of severity of COPD.

| Severity    | Number (percent) | Symptom scores | Activity scores | Impact scores | Total scores |
|-------------|------------------|----------------|-----------------|---------------|--------------|
| Mild        | 1 (2.5)          | 39.05          | 23.10           | 25.20         | 26.09        |
| Moderate    | 15 (37.5)        | 42.12          | 46.68           | 29.57         | 37.30        |
| Severe      | 20 (50)          | 45.56          | 52.20           | 36.60         | 43.97        |
| Very severe | 4 (10)           | 80.97          | 79.89           | 48.00         | 63.00        |

Relationship between SGRQ total scores and their subdomains namely, symptom scores, activity scores and impact scores and FEV1 % predicted value measured by spirometry testing revealed negative correlation. Logically, the higher SGRQ scores mean the poorer quality of life. Correlation

coefficient (r) were equals to -0.368, -0.326, -0.381 and -0.305 which P-values equals to 0.019, 0.04, 0.015, 0.056 for total scores, symptom scores, activity scores, and impact scores, respectively. The graphic illustration is shown in Figure 1.

**Figure 1.** The graph was plotted by using level of severity of COPD (X), and SGRQ scores (Y) in 4 groups including symptom, activity, impact and total scores.

## Discussion

COPD adversely affects quality of life of the patients. These may be result from the disease itself, comorbid diseases or its treatment. St George's Respiratory Questionnaire (SGRQ), a disease-specific measurement tool, was created by Jone P *et al.*<sup>(4)</sup> It has been widely accepted for evaluation of quality of life in COPD patients.<sup>(10-13)</sup>

We observed in the present study impaired quality of life in Thai COPD patients. Our patients' average SGRQ equaled to 42.95, symptom score 47.68, activity score 52.17, and impact score 34.82, compared with SGRQ scores in healthy individuals previously reported is 6, 12, 9, 2 respectively.<sup>(5)</sup> The SGRQ score in COPD patients, from England's study showed total scores of 68.2<sup>(5)</sup>, which is higher than our study's, reflecting poorer quality of life. In addition to lung function deterioration, the importance of comorbidities in COPD patients has been recently stressed; these includes significant weight loss, malnutrition, angina pectoris, osteoporosis, respiratory tract infection, depression, etc.<sup>(1,14,15)</sup> which altogether adversely affect overall quality of life in such patients. Yeo J. *et al.* reported the more comorbid diseases, the worse quality of life in COPD patients.<sup>(16)</sup> In our study, more than 60% had no comorbidity and only 5% had more than 2 comorbid diseases. It was quite lower than previously reported.<sup>(17, 18)</sup> Van Manen reported 22.6% of COPD patients had more than 3 comorbid diseases.<sup>(18)</sup> Furthermore, the quality of life implies overall satisfaction in living. This therefore depends on several factors, such as, perception and threshold of dyspnea, patient's life style and expectation. These studies in different groups of COPD patients may be difficult to be compared directly.

FEV1 % predicted from spirometric results showed that severity in our patients is averagely severe. Correlation coefficient between FEV1 % predicted value and SGRQ total score and its subdomains in symptom, activity and impact aspects was -0.368 ( $P = 0.019$ ), -0.326 ( $P = 0.04$ ), -0.381 ( $P = 0.015$ ) and -0.305 ( $P = 0.056$ ), respectively. Because higher SGRQ scores mean worse quality of life and lower FEV1 mean more severe airway obstruction; the negative correlation has been observed. Although FEV1 value was directly influenced on quality of life, the correlation is rather weak.

Compared with previous studies regarding SGRQ scores and lung function in COPD patients, Ferrer *et al.* (1996)<sup>(9)</sup> found that SGRQ Spanish version had conflicting results; correlation coefficient between total SGRQ scores, dyspnea scores and FEV1% were 0.59 and -0.45, respectively. In Sweden, Engstrom *et al.* (2001)<sup>(19)</sup> reported correlation between SGRQ total score and FEV1% with  $r = -0.42$ . Moderate correlation was shown in Indonesian COPD patients<sup>(20)</sup> ( $r = -0.46$  for activity scores, -0.43 for impact scores and -0.52 for total scores). Our study revealed weaker correlation.

Less effect on impact scores and weak correlation of FEV1 value and SGRQ score in our study could be explained by several factors. Firstly, our COPD patients were rather older than that in other studies. They might have limited activities by other general conditions and tended to well accept physical dependence. Secondly, Thai culture and Buddhism religion influence the way people think. Some COPD patients might believe their illnesses were consequences from whatever bad things they had

done in the past life (Law of Karma). Besides, Buddhism teaches people to live and be satisfied with how they are and what they have. Thirdly, the patients may get secondary gain from their family's support. To take care of the parents when they are getting older or sick is one of the most important Thai style's cultures. And not to do or neglect to do so is an unacceptable sin in Buddhist ethos. Therefore, Thai COPD patients might receive better care from their families when the disease progresses.

Interestingly, symptom scores were not much different between mild, moderate and severe COPD (Figure 1) when compared with activity score. However, high slope of the graph representing both symptom score and activity score in very severe COPD group was observed. These can be explained by inactivity in COPD. In the early period, COPD patients usually respond to their breathlessness by doing fewer activities, avoidance of doing exercises especially in the elderly, so the symptoms may not interfere with their livings.<sup>(21)</sup> Although better correlation than symptoms, exercise limitation could be compensated well in mild to moderate severity COPD if exercise training or pulmonary rehabilitation program was provided.<sup>(22)</sup> Therefore, the severity of airway obstruction alone might not be a good predictor for overall functional capacity and, of course, quality of life in COPD patients. The patient eventually faces dyspneic symptoms on daily activities which unavoidably lessen quality of life in the late phase of the disease with very poor lung reserve.

In conclusion, evaluation of airway obstruction by FEV1% predicted is weakly correlated to overall quality of life in Thai COPD patients. Quality of life is a holistic patient-centered outcome that

should be more concerned as a major target in COPD treatment. Lastly, the use of the questionnaire in clinical practice needs to be investigated.

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